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ABSTRACT

This publication contains the three numeracy units of the three levels of Support Materials for Agricultural Training (SMAT) in the area of occupational health and safety: Level 1 (starting), 2 (continuing), and 3 (completing). The units are designed to help the learner improve his or her numeracy skills needed to deal with occupational safety and health. SMAT materials can be used by the individual, with a mentor, or in a group or class. An introduction describes how to use the materials, types of activities, and materials needed. Each level contains agriculture-related mathematics activities. Model answers are provided. Topics covered in Level 1 are graphing and reading graphs. Topics covered in Level 2 are making comparisons and why do we need statistics? Topics covered in Level 3 are cost/risk analysis--single item and cost/risk analysis--whole farm. (YLB)

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Occupational Health and Safety

Numeracy
Level 1

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Support Materials for Agricultural Training

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Introduction

Welcome to this unit of the SMAT materials, *Occupational Health and Safety 1 - Numeracy.*

SMAT stands for Support Materials for Agricultural Training. SMAT will help you improve your written and spoken communication skills and your numeracy skills, so you can succeed at training programs or communicate more successfully in your workplace.

Where this fits

SMAT has four topics: *Agricultural Production, Farmers as Employers, Farm Management and Leadership* and *Occupational Health and Safety.*

This unit is Level 1 of *Occupational Health and Safety - Numeracy.* There are three units of *Occupational Health and Safety - Numeracy:* Level 1 (starting), 2 (continuing) and 3 (completing). Each unit has two parts: Communication Skills and Numeracy.

After you finish this unit, you could try the other units at the same level: *Agricultural Production 1 - Numeracy, Farmers as Employers 1 - Numeracy, Farm Management and Leadership 1 - Numeracy.*

Then you could try the units at a higher level.

You do not have to complete every unit in SMAT. It is up to you to choose the most useful parts and work through them.

How to use these materials

You can use the SMAT materials by yourself, with someone to help you, or in a group or class. It is hard to work by yourself, so it is a good idea to have someone who can give you advice and feedback (a mentor). This person could be a trainer from a college or community centre, a relative, a neighbour or a friend.

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Outcomes

After you finish the SMAT materials you will be able to communicate more effectively in speech and writing and use numeracy skills more effectively, and interpret simple graphic information.

How long should I spend?

This depends on you. The amount of time will be different if you are working by yourself or in a group, with a mentor or without, and if you do all the activities or not. Take enough time to do all the activities that are relevant to you, to a standard high enough to satisfy you.

Activities

Each unit has a number of activities for you to do. In the communications units there are four types of activities:

- key word activities
- reading activities
- writing activities
- spoken communication activities.

In the numeracy units there are numeracy activities.

Sometimes you can write answers to these activities in the book. Sometimes it is better to write them in a notebook. Sometimes for the spoken communication activities you will need to go and speak to some other people.

In some places there are also practice writing and practice reading activities. These are extra activities. You can choose to do them if you think you want extra practice in something.

Most of the activities have model answers in the back of the book. You can also ask your mentor to check your answers.

What you need

Before you start, make sure you have the following:

- a notebook (A4 size is best)
- pens, pencils, highlighter pens
- a file or folder to keep extra papers.

Assessment

There is no formal assessment for SMAT. But it is a good idea to have a mentor look at what you have done. That way you can decide together what you have learned and what you need to improve.

Remember, the SMAT materials are a resource for you to use to improve your skills. It is up to you how you use them and how much of them you use.

Graphing

We often collect information in the form of statistics. They help us predict what will happen or show what has happened. This information is called data.

graphing

data	*numbers that can be used to create information*
graph or chart	*showing data as a picture*

We can show this data in a number of ways. One way to show data is to use a graph. Graphs give a quick picture of the data. There are a number of different types of graphs or charts. We will look at three types:

- pie chart
- line graph
- column/bar graph.

Let's look at them in order.

Pie charts

A pie chart is a circle that is divided into pieces. The larger the piece the more data in it. Circles can be divided into pieces in all sorts of ways. Here are some examples below.

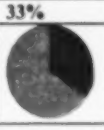
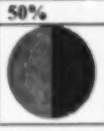
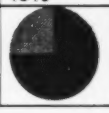
1/10	1/5	¼	1/3	½	2/3	¾	1
one tenth	one fifth	one quarter	one third	one half	two thirds	three quarters	one whole/ unit
0.1	0.2	0.25	0.33	0.5	0.67	0.75	1.0
10%	20%	25%	33%	50%	67%	75%	100%
							

Figure 1: Pie charts

Reproduced with permission from Understanding Farm Chemical Labels *published by The Workplace Language Unit, Victoria University, Melbourne 1996.*

Skills: Reading a pie chart

When you read a pie chart you need to:

1. Read the title of the chart to find out what the chart is about.
2. Look at the labels or key/legend on the pie chart to find out what data is being shown.
3. Look at the sizes of the pieces shown on the chart and put these in order.

These three steps will help you understand pie charts.

Remember that the sizes of the pieces of a pie chart show the amount of data. The largest piece shows the most data. The smallest piece shows the least data.

Look at the picture of a pie chart.

Accidents on farms by seasons 1996/1997

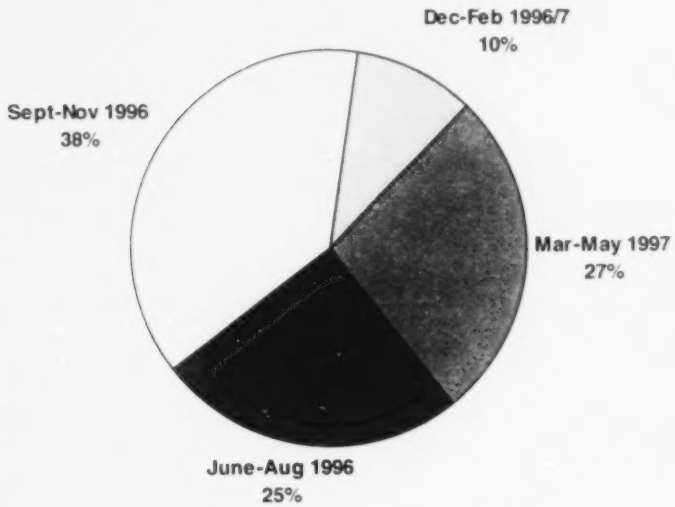


Figure 2: Farm accident pie chart

This pie chart shows when accidents happened on farms in 1996/1997. The year has four seasons so the pie chart has four pieces.

Activity 1

1. Which is the largest piece of this pie chart?
2. Circle the largest piece.
3. What else tells you that it is the largest piece?
4. Which is the smallest piece of the pie chart?

September to November is the largest piece. More accidents occur at this time than at any other time. You will see that it is more than one third of the circle. This means that more than one third of accidents occur between September and November.

The smallest piece is the December to February piece. This means the smallest number of accidents occur between December and February.

The total percentages in a pie chart add up to 100%. Let's check this pie chart.

On the calculator key in: 38 + 10 + 27 + 25 =

The display screen will show: 100

Line graphs

Line graphs are another type of graph.

Here is the same information in a line graph.

Accident on farms by seasons 1996/97

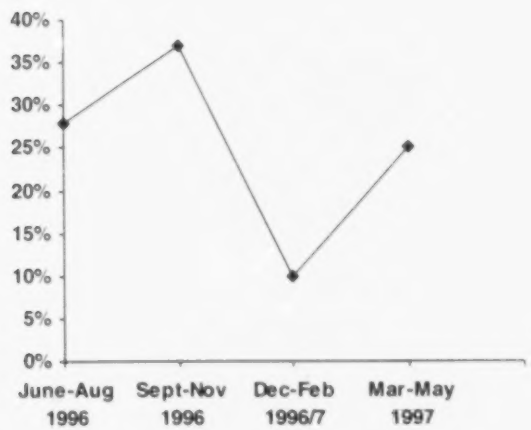


Figure 3: Line graph

You can see that the highest point is for September to November. This is when the most accidents happen. It reads as between 35% and 40%. The lowest point is December to February. This is when the smallest number of accidents happen. It reads at about 10%.

Column/bar graphs

Another type of graph is the column or bar graph.

Here is the same information in a column graph.

Accident on farms by seasons 1996/97

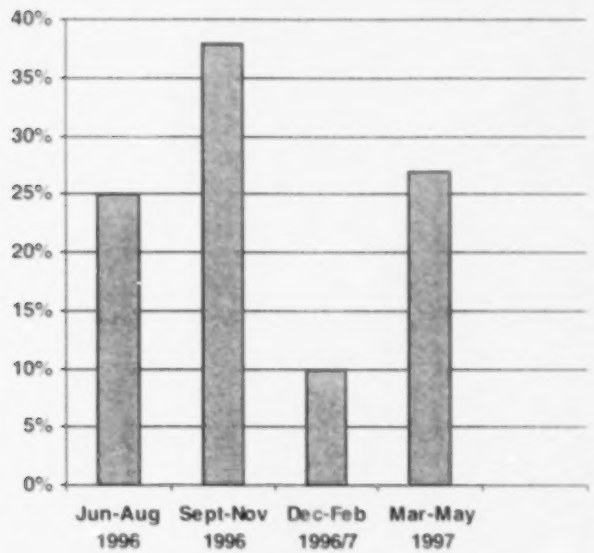


Figure 4: Column graph

In this graph, the highest column shows the most accidents. The shortest column shows the smallest number of accidents.

Most people refer to column graphs as bar graphs. A bar graph looks like this.

Accidents on farms by seasons 1996/97

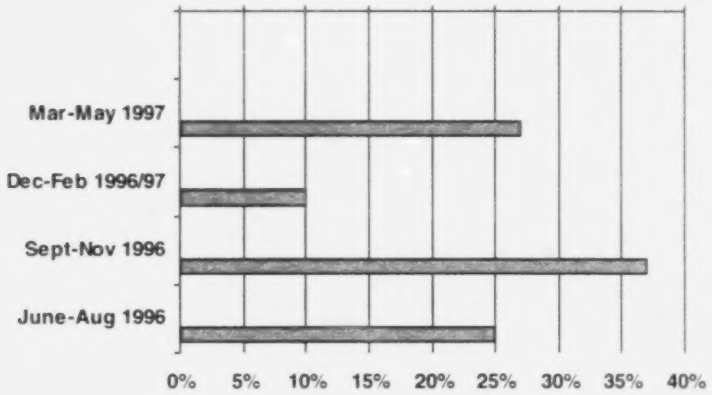


Figure 5: Bar graph

A bar graph is a column graph that has been turned sideways.

graphs

Here are words that are used with graphs:

axes	*Axes are used for line and bar/column graphs. The horizontal axis is the line drawn along the bottom and the vertical axis is the line drawn up the side.*
scale	*The numbers on the axes are the scales.*

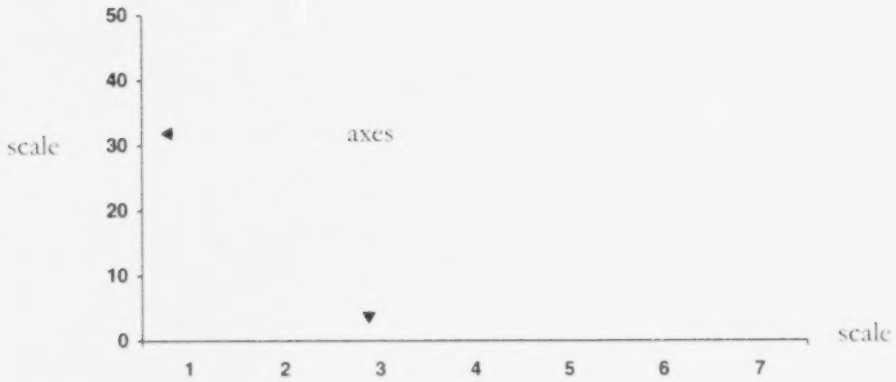


Figure 6: Axes and scale

All graphs should have:

1. a title that explains what the graph is about
2. clearly labelled information on the axes or in the pie chart, suitable scale.

A graph should be easy to understand. A graph that doesn't make sense does not do its job.

Reading graphs

Skill: Interpreting and reading graphs

When you look at a graph or chart you should always:

1. Read the title to find out what the graph is about.
2. Look at the axes to see what is being shown.
3. Read the scale to find out the units of data being shown. Is it a whole number, a fraction, a decimal, a percentage?
4. Look at the sizes of the data. The graph may be showing data in thousands.
5. Put the data into order from largest to smallest.

These steps will help you read and interpret graphs.

The pie chart in Figure 7 goes with an article about chemicals.

The graph compares a number of chemicals which can cause ill effects.

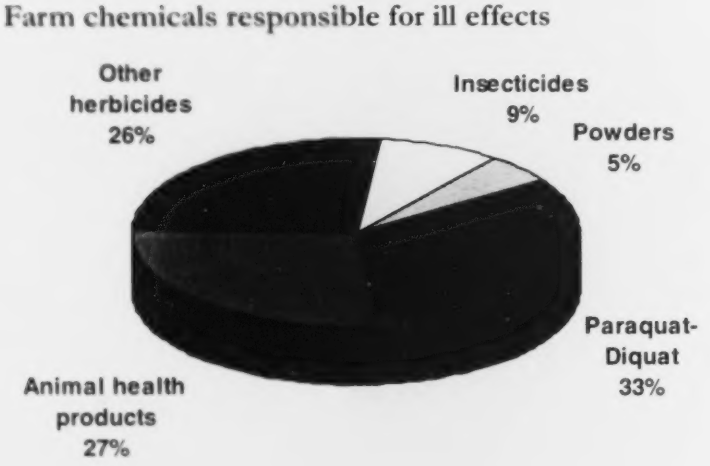


Figure 7: Farm chemicals effects chart

The total per cent in a pie chart should be 100%.

Activity 2

1. Answer the following questions.
   - What is the largest piece of the pie?

     .....
   - What is the smallest piece of the pie?

     .....
   - Do the figures in the chart add up to 100%

     .....
   - What is the percentage for Paraquat-Diquat?

     .....

-

- What is the percentage of ill effects caused by other herbicides?

- What is the total percentage of ill effects caused by herbicides?

(Tip: add the figure for Paraquat-Diquat to the figure for the other herbicides)

Figure 8: Spraying chemicals

2. Think about the farm chemicals you use. Which groups do they come under on the pie graph?

.....

.....

.....

Here is another pie chart on a similar topic.

Reported ill effects from farm chemical use

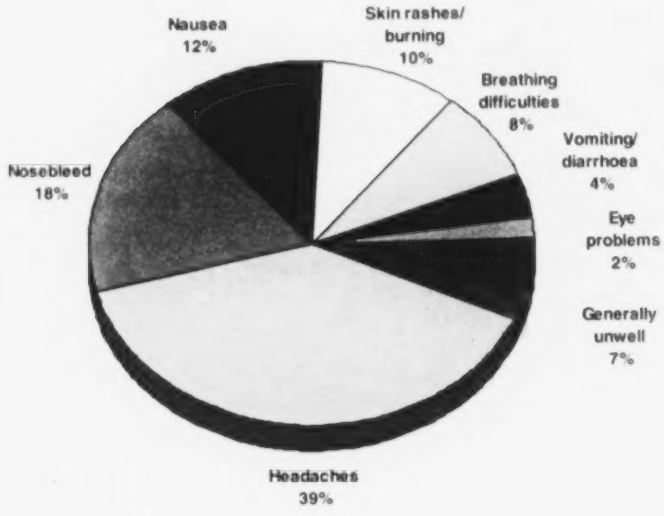


Figure 9: Ill effects from farm chemical use chart

Activity 3

Use the information and pie chart in Figure 9 to answer the following questions:

1. What is the subject of the pie chart?

.....

2. What is the most common ill effect from farm chemical use?

.....

3. What percentage of farmers who suffered ill effects, had nausea?

.....

The best way to learn to read graphs is to practice. The more graphs you read, the better you will be at interpreting them.

Activity 4

1. Look at the following pie chart.

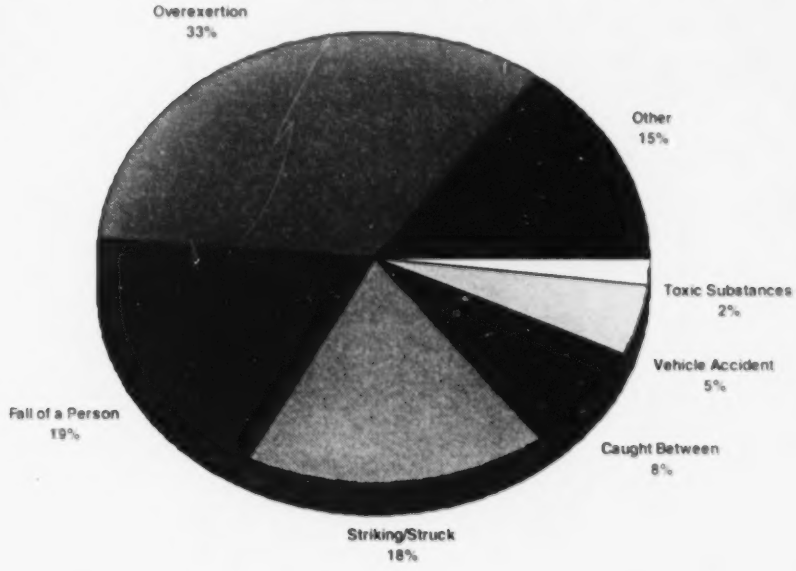


Figure 10: Victorian WorkCover claims pie chart

This pie chart is based on the number of WorkCover claims.

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- What causes the most claims?

- What caused the least number of claims?

- Are you more likely to fall or be involved in a car accident on your farm?

- How big a risk to farm workers do you think toxic substances are?

2. This bar graph is of Victorian farm deaths by age for the period January 1985 to December 1996. Answer the following questions.

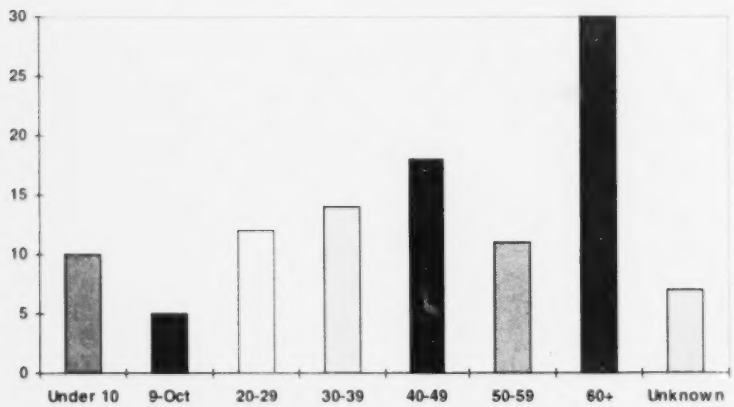

Figure 11: Farm fatalities by age graph

- Which age group had the most number of deaths?

- Which age group had the least number of deaths?

- Why do you think there may be so few deaths in this age group?

.....

.....

3. Look at this chart.

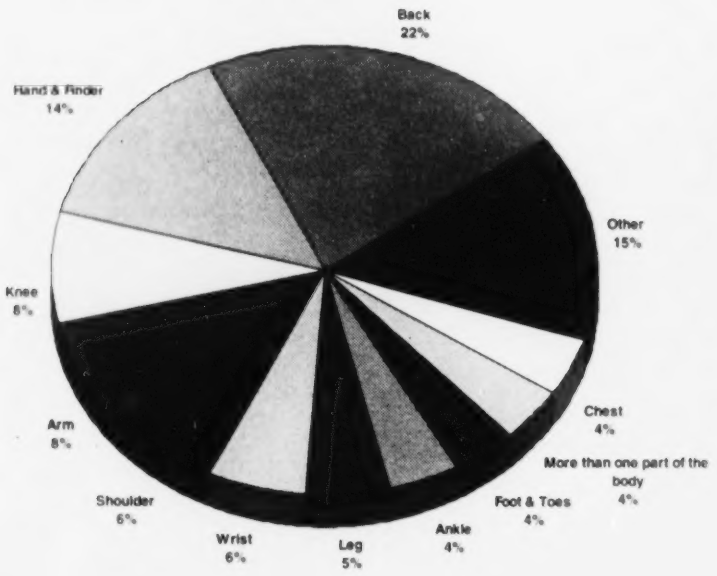

Figure 12: Farm injuries bodily location pie chart

- What is this chart about?

.....

- What is the most likely part of the body to be injured?

.....

- When a person is injured, is it likely that they will have injuries on more than one part of the body?

.....

- What percentage of injuries are on the hands and fingers?

.....

4. Look at the graph in Figure 13. This is a graph about farm fatalities investigated by the Victorian WorkCover Authority and what caused the deaths.

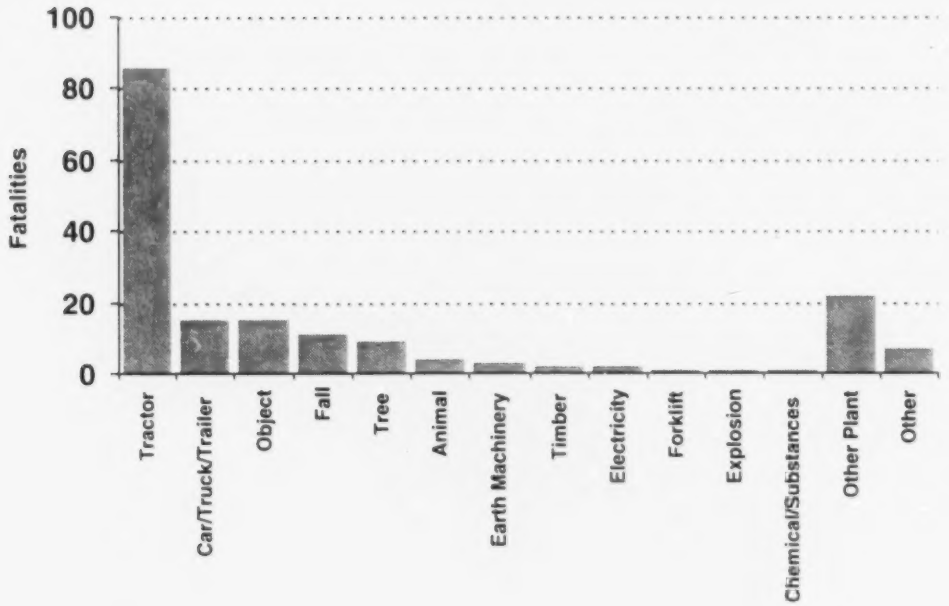

Figure 13: Farm fatalities and cause

- What type of graph is it?

- Over what time was the information collected?

- What caused the most deaths on farms?

- How many deaths were caused by a fall?

- What was the total number of deaths on farms between January 1985 and December 1996?

Model answers

Activity 2

Question 1

The graph shows that:

- The largest piece of the pie is Paraquat-Diquat.
- The smallest piece of the pie is powders.
- Yes, 26 + 9 + 5 + 33 + 27 = 100
- Paraquat-Diquat is responsible for 33% (about one third) of the ill effects caused by chemicals.
- Animal health chemicals cause 27% of ill effects (just over one quarter).
- Other herbicides are responsible for 26% (about one quarter) of the ill effects.
- If you want to know the total percent of ill effects caused by herbicides then you add the percent for Paraquat-Diquat to other herbicides. This would be 33% and 26% which is 59%.

Activity 3

1. The pie graph shows the types of ill effects that the farmers suffered from farm chemical use.
2. Headaches are the most common symptom of harm caused by chemical usage.
3. 12% of farmers suffered nausea ill effects after using chemicals.

Activity 4

Question 1

- Overexertion
- Toxic substances
- More likely to fall.
- Small

Question 2

- 60+ age group
- 10-19 age group
- A possible reason for so few deaths in this age group is that they would be attending school and spending less time on the farm.

Question 3

- This graph is about which parts of the body are injured.
- The back is most likely to be injured.
- No, the likelihood of being injured on more than one part of the body is only 4%.
- 14% of injuries are on hands and fingers.

Question 4

- It is a column (or bar) graph.
- The information was collected over a twelve year period from January 1985 to December 1996.
- Tractors caused the most deaths on farms.
- Eleven deaths were caused by a fall.

- The total number of deaths is found by adding the numbers for each cause of death .

  On a calculator key in : 86 + 15 + 15 + 11 + 9 + 4 + 3 + 2 + 2 + 1 + 1 + 1 + 22 + 7 =

  The display should show 179.

  There were 179 deaths on farms between January 1985 and December 1996.

  Often in graphs because they represent data in a picture you will not always be able to work out the exact figures. Because of the scale of the graph you may have found a slightly different answer for the number of deaths caused by falls and the total number of deaths.

Occupational Health and Safety

Numeracy
Level 2

Support Materials for Agricultural Training

Acknowledgments

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- a notebook (A4 size is best)
- pens, pencils, highlighter pens
- a file or folder to keep extra papers.

Assessment

There is no formal assessment for SMAT. But it is a good idea to have a mentor look at what you have done. That way you can decide together what you have learned and what you need to improve.

Remember, the SMAT materials are a resource for you to use to improve your skills. It is up to you how you use them and how much of them you use.

Making comparisons

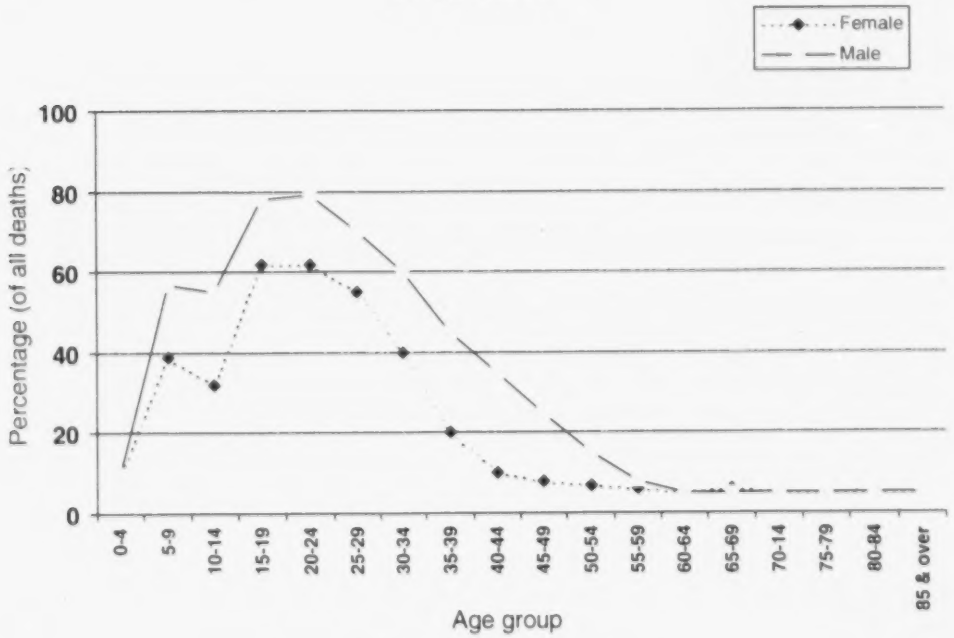
In *Occupational Health and Safety 1* we looked at different types of graphs. These graphs showed one piece of information on them. It is also possible to show two or more related pieces of information on a line or bar graph.

A pie chart is best used to show data about one topic, for example, injury by age groups. To show this data you would have to split the chart into males and females. This would make the chart too complex and difficult to read. The best thing about using a pie chart to show data is its simplicity.

Line and bar graphs can show more than one piece of information at a time. This lets us compare information.

When more than one piece of information is put on a graph, there needs to be a key to explain the different bars or lines. Look at the graph in Figure 1.

Injury as a proportion of all deaths, Australia 1992: by age and sex



Source: Harrison 1995 in Injury Research and Prevention

Figure 1: Line graph

The graph shows the percentage of deaths caused by injury. This graph compares females and males.

- Which line is the line for males?
- Which line is the one that represents females?
- Where on the graph does it tell you which line is which?
- Find the title of the graph.

Occupation Healthand Safety 1- Numeracy gives you steps to follow when reading a graph.

Activity 1

1. Use the graph to answer these questions.

   - Do females or males have more deaths caused by injury?

   .....

   - Which age group of males has the most injury-related deaths ?

   .....

   - Which age group of females has the most injury-related deaths?

   .....

   - Do the males and females follow the same pattern?

   .....

2. Graphs can raise some interesting issues. Think about the following questions (the answers are not on the graph).

   - Why do you think that both female and male deaths caused by injury decrease after about 29?

   .....

- What else causes death other than injury?

.....

- Why do you think females have fewer accidents than males?

.....

- Why do you think so few of the deaths in people over 55 are caused by injury?

.....

- What might be the cause of the majority of deaths in this age group?

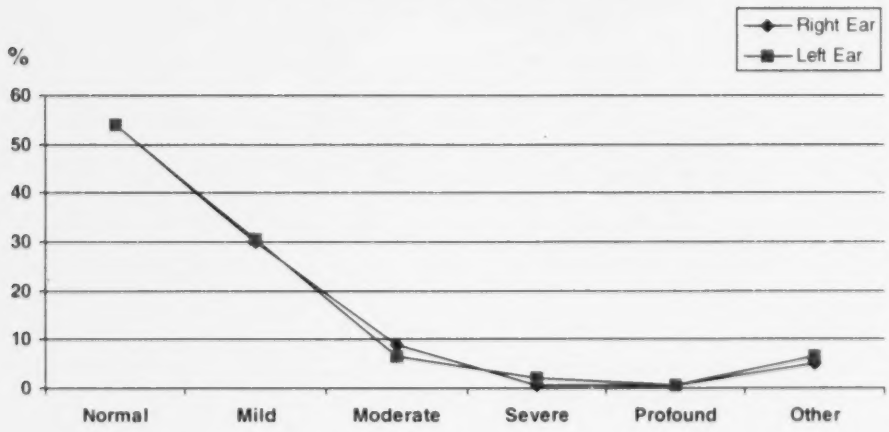
.....

- What questions would you like to ask about the graph?

.....

3. Look at the graph below and answer the following questions.

Distribution of Hearing Loss Catergories by Ear
15 to 24-year-old farmers & farm workers



- Do most 15 to 24-year-old farmers have normal hearing?
- A slightly higher percentage of those surveyed had moderate hearing loss in the left or right ear?
- Overall, would you say that 15 to 24-year-olds had good hearing or poor hearing?
- Do you think a graph of hearing loss by ear in 65 to 74-year-olds would look different to this graph. How would it look different?

Column graphs

The previous example compared male and female on a line graph. It is also possible to show comparisons on a column or bar graph.

Look at the following example:

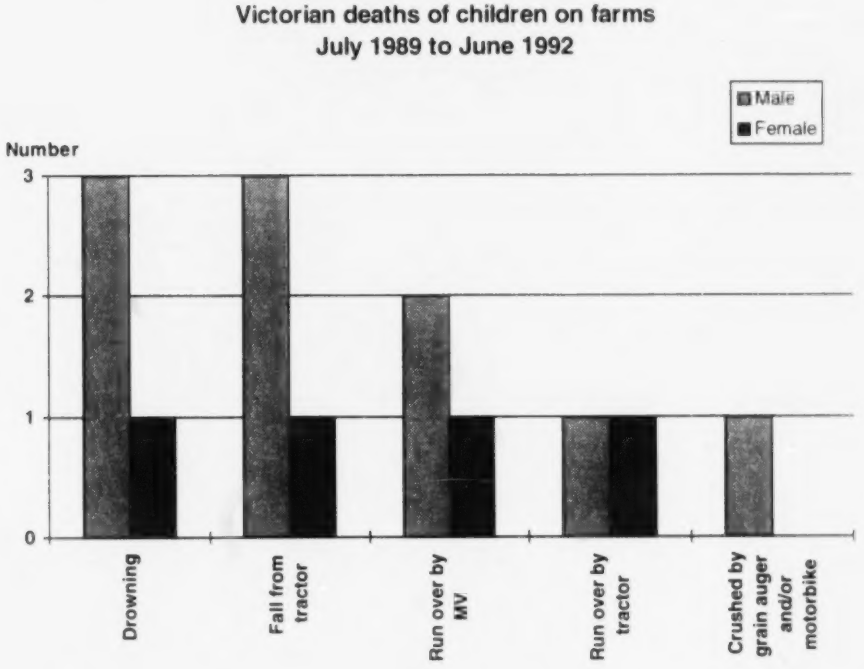


Figure 2: Bar graph

This is a graph of deaths of children on farms divided into cause of death and gender.

Activity 2

From the graph answer the following questions.

1. What caused the most deaths?

.....

2. Are male or female children more likely to be killed?

.....

3. What caused the least number of deaths?

.....

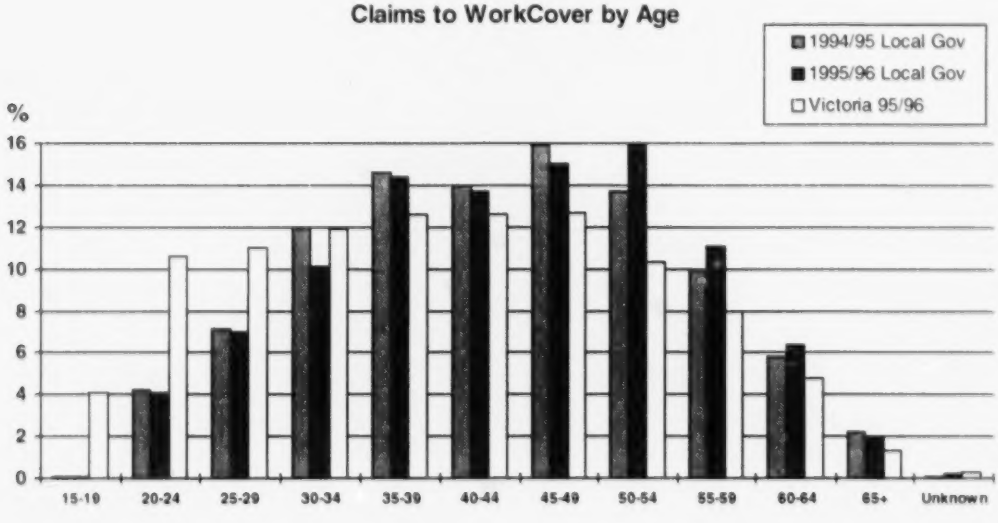
4. Do the males and females follow the same trends?

.....

5. What can you say about the number of deaths to females compared to the number of deaths to males?

.....

Read the graph below and answer the following questions.



6. In the 1995/96 claims for local government, which age group had the most workcover claims?

.....

7. Why do you think this age group has more claims?

.....

8. In which group do the number of claims in Victoria in 95/96 exceed the number of claims in local government in 95/96?

.....

9. Why do you think there are more claims in Victoria in these age groups compared to local government?

.....

10. Which two age groups have the lowest number of claims? (Do not include the unknown group.)

.....

11. Why do you think there are fewer claims in these age groups?

.....

Creating graphs

A graph gives a quick visual picture. It is sometimes useful to graph information from a table so that it is easier to understand what the figures are saying.

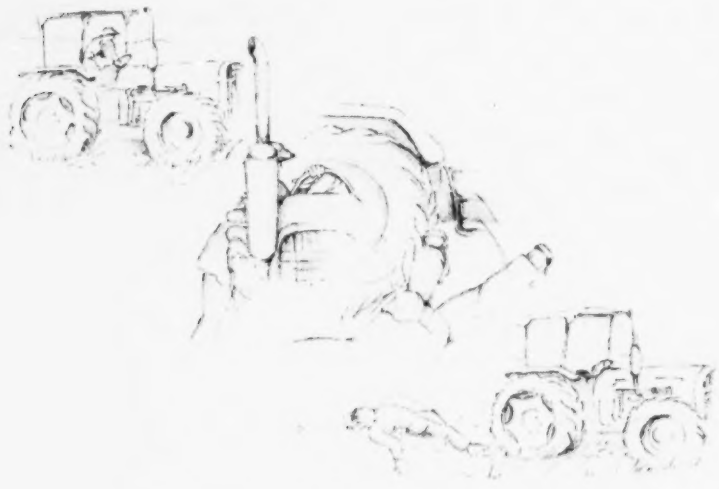


Figure 3: Tractor accident

The following table is a comparison between Queensland and Victorian tractor deaths reported by occupational health and safety officials.

Year	Vic	Qld
1985	3	11
1986	13	9
1987	7	10
1988	11	3
1989	3	11
1990	10	5
1991	6	8
1992	7	5
1993	10	10
1994	7*	5*

* incomplete data

Figure 4: Tractor deaths in Qld and Vic, 1985 - 94

To graph this information you need to draw a set of axes with scales, title, labels and a legend.

The scale is worked out on the vertical axis by:

- finding the highest frequency (note: frequency is the number of accidents).
- working out a scale that will give about 10 increments.

In this case the highest frequency is 13. The increments can be by ones or by twos. The increments are shown in ones on the following graph.

The axes will look like this:

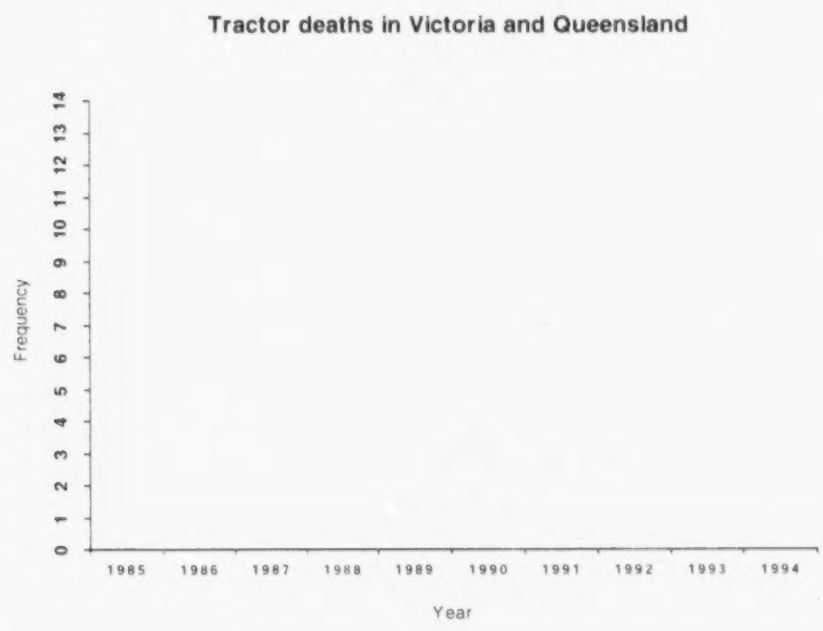


Figure 5: Graph showing axes only

It is now possible to plot the information on to the graph. The following example is a column graph.

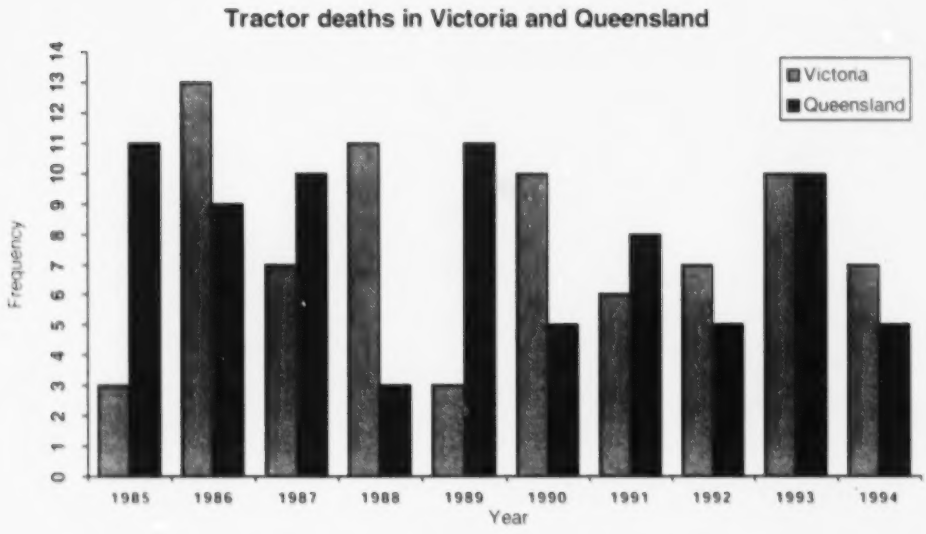

Tractor deaths in Victoria and Queensland
Victoria
Queensland
Frequency
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
1985 1986 1987 1988 1989 1990 1991 1992 1993 1994
Year

Figure 6: Bar graph of tractor deaths

Activity 3

1. Use the information in the following table to create a line graph.

Age group	No. females	No. males
0 - 4 years	19	23
5 - 9 years	20	38
10 - 14 years	51	63

2. The following figures are the annual average unintentional injury death rates for Australia from 1990 - 1992. Graph the data into a column graph.

Category	Urban (rate per 100 000)	Rural (rate per 100 000)
Transportation	41	144
Production	5	24
Burns and scalds	2	9
Other unintentional	6	21
Poisoning Pharmaceuticals	3	6
Falls (non-production)	9	22
Drowning	7	18

Percentages and numbers

Often the same information can be given as either a percentage or a number.

Does it matter which is given? Yes! Let's look at Figure 7.

Source: Fatalities investigated by the VWA and fall within its health and safety jurisdiction

Figure 7: Bar graph of fatalities by industry

This information is about the number of deaths at the workplace in 1996. It is divided into industry groups.

How many deaths were there altogether? (You might like to use your calculator.)

Which industries had the most deaths in 1996?

Does this graph tell you which industry is most dangerous?

From this graph, you would say that construction sites and farms are equally dangerous. They both had 11 deaths in 1996.

What information do you think you need that you don't have?

You need to know how many people work in these industries.

In fact, more people work in construction than in agriculture but they have the same number of deaths. So which industry is really more dangerous?

Let's look at a another example.

The Neeton Base Hospital recorded that there were 250 cases of injury over the last year. Of these, 125 were residents of the town and the other 125 from nearby farms. So which is more dangerous: the town or the farms? What other information do you need?

In this case we need to know the percentage of people injured in town and the percentage injured on the farms. To calculate the percentage you need to know the population.

The town of Neeton has a population of 5000. There are 1000 people living on the surrounding farms.

The percentage is found by dividing the number of accidents by the population and multiplying by 100 (to change to a percentage).

So, the percentage of accidents for Neeton is found by dividing 125 by 5000 and multiplying by 100.

On the calculator, key in 125 ÷ 5000 % (or, 125 ÷ 1000 x 100)

The display screen will show: 2.5

2.5% of people from the town of Neeton were hospitalised with injuries last year.

The percentage of accidents for the farming district is worked out by dividing 125 by 1000 and multiplying by 100.

On the calculator, key in 125 ÷ 1000 % (or, 125 ÷ 1000 x 100)

The display screen will show: 12.5

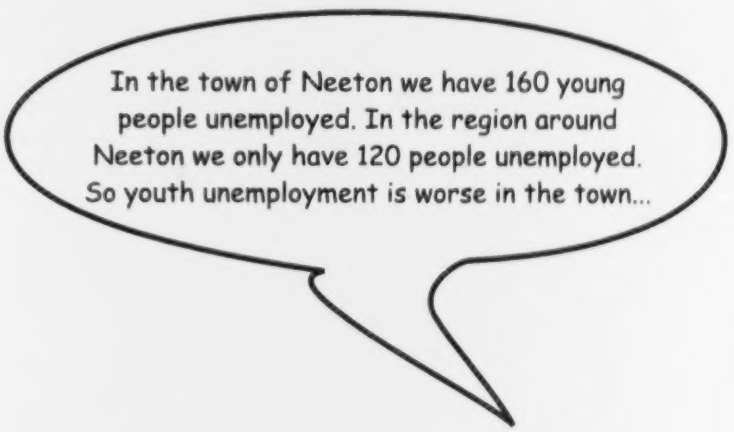
12.5% of the farming community were hospitalised with injuries last year.

From the percentages it is possible to see that the farms have a lot more accidents than people in the town.

In the same way, in the previous example, the percentages show that agriculture is more dangerous than construction.

Activity 4

A local member of parliament said:


In the town of Neeton we have 160 young people unemployed. In the region around Neeton we only have 120 people unemployed. So youth unemployment is worse in the town...

What would you say to the MP? Use a calculator to work out the percentages.

Why do we need statistics?

Statistics are used to:

- show trends
- clearly define problem areas
- show where some action may be needed.

Look at the following pie chart on farm chemicals responsible for ill-effects.

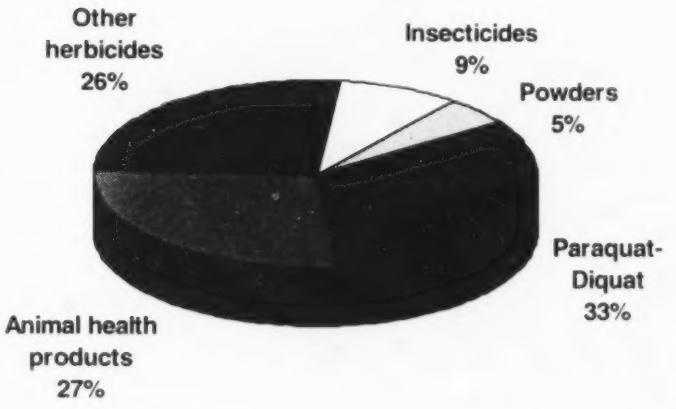


Figure 8: Chemicals responsible for ill-effects

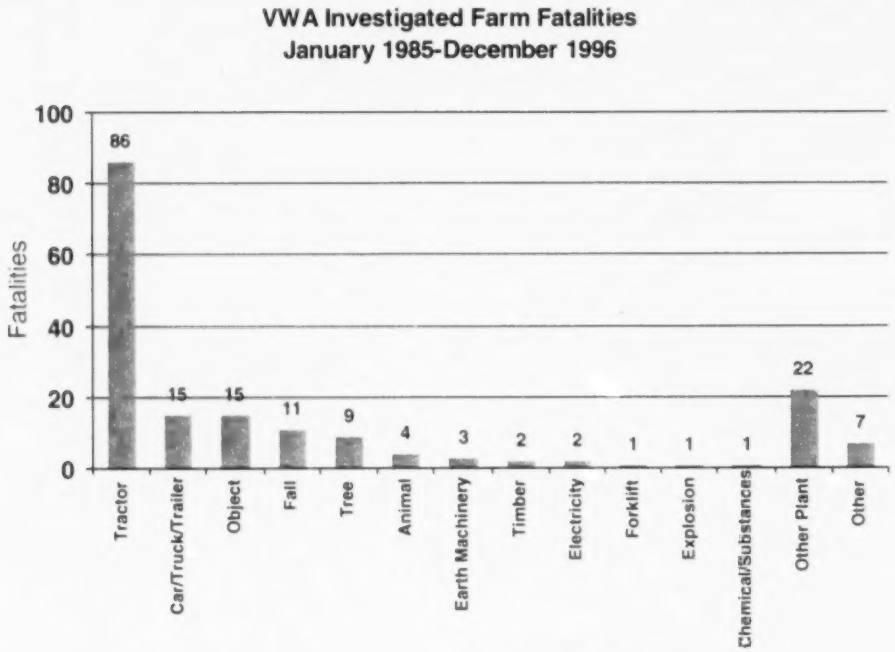
The chart shows that the chemicals causing the most ill-effects are herbicides.

Note: Paraquat diquat is a herbicide often sold under the name "Sprayseed".

This may suggest that some farmers use chemicals unsafely. Farmers may not be aware that chemicals are causing ill-effects so they may not be taking precautions. People may not connect a headache to the use of a chemical.

Activity 5

Look at the graph in Figure 9.



Source: Fatalities investigated by the Victorian WorkCover Authority and fall within its health and safety jurisdiction.

Note: Some fatalities have more than one hazard.

Figure 9: Farm fatalities graph

1. What has caused the most deaths?

2. Can you think of some legislation that was introduced because of the number of tractor accidents?

3. Look for examples of graphs and other statistics, for example in newspapers. Is the information clear? Could it be shown in a different way?

Model answers

Activity 1

Question 1

- Males have more deaths caused by injury.
- The most deaths in males occur in the 20 to 24 year age group.
- The most deaths in females occur in the 15 to 19 year and the 20 to 24 year age groups.
- The males/ females follow the same pattern.

Question 2

- The decrease in death by injury for people over 29 may be because they take less risks or they have more experience.
- The other causes of death are diseases (infectious and non-infectious) or body parts ceasing to work.
- Females may have less accidents because they may play and work in less hazardous environments, may be less likely to do high risk activities.
- When people reach the age of 55 they are more likely to be dying from disease rather than accidents. Also, fewer are likely to be in the workforce.

Question 3

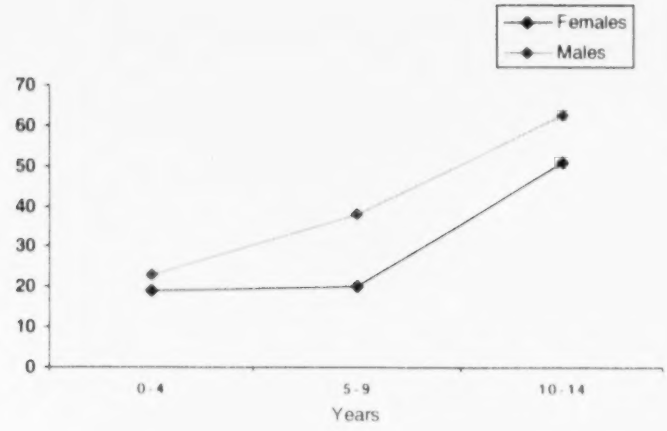
- Yes, over 50% of 15 to 24-year-old farmers and farm workers have normal hearing.
- A slightly higher percentage of those surveyed had moderate hearing loss in the right ear.
- About 90% of 15 to 24-year-olds have normal hearing, mild or moderate hearing loss. I would say that this group have good hearing.
- I think a graph of hearing loss in 65 to 74-year-olds would show a greater number of people with severe or profound hearing loss and less with normal hearing.

Activity 2

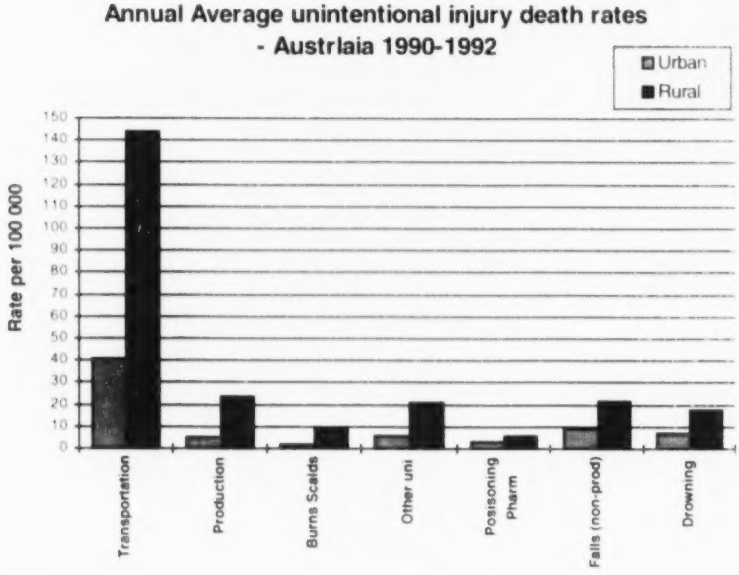
1. Most deaths were caused by drowning and falls from a tractor.
2. A male child is more likely to be killed.
3. The least number of deaths were caused by:
   - being crushed by an auger
   - motorbike
   - run over by a tractor.
4. Males and females do not follow the same trends.
5. Male children are more likely to be killed on the farm than female children.
6. The 50 to 54-year-old age group had the most claims.
7. This age group could have more claims because of their age and also because there may be a large number of people in this age group who work for local government.
8. Between the ages of 15 and 34 there are more workover claims in Victoria in Victoria than in local government.
9. There could be a greater percentage of people in this group working in Victoria than in local government. The work performed by Victorians in this age group could have a higher risk of injury than the work performed by people aged between 15 and 34 in local government.
10. The two age groups with the lowest number of claims are 15-19 and 60+.
11. There could be a smaller percentage of people in these groups that are employed in Victoria.

Activity 3

1.



2.



Activity 4

The percentage of unemployed in town is:

$160 \div 5000 \times 100 = 3.2\%$

The percentage of unemployed in the region around Dystopia is:

$120 \div 1000 \times 100 = 12\%$

The regional areas have a much higher unemployment rate.

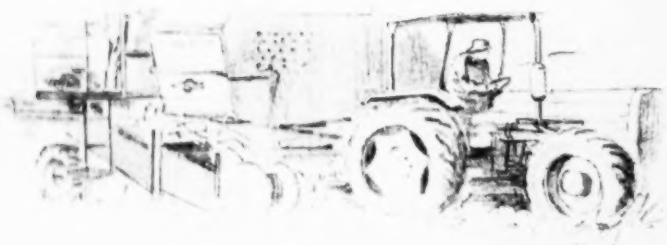
Activity 5

1. Tractors caused the most deaths.
2. The legislation that requires tractors to have rollbars (ROP) was introduced because of the number of deaths caused by tractors.

Occupational Health and Safety

Numeracy
Level 3

Support Materials for Agricultural Training



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Introduction

Welcome to this unit of the SMAT materials, *Occupational Health and Safety 3 - Numeracy.*

SMAT stands for Support Materials for Agricultural Training. SMAT will help you improve your written and spoken communication skills and your numeracy skills, so you can succeed at training programs or communicate more successfully in your workplace.

Where this fits

SMAT has four contexts: *Agricultural Production, Farmers as Employers, Farm Management and Leadership* and *Occupational Health and Safety.*

This unit is Level 3 of *Occupational Health and Safety - Numeracy.* There are three units of *Occupational Health and Safety:* Level 1 (starting), 2 (continuing) and 3 (completing). Each unit has two parts: Communication Skills and Numeracy.

After you finish this unit, you could try the other units at the same level: *Agricultural Production 3 - Numeracy, Farmers as Employers 3 - Numeracy, Farm Management and Leadership 3 - Numeracy.*

You do not have to complete every unit in SMAT. It is up to you to choose the most useful parts and work through them.

How to use these materials

You can use the SMAT materials by yourself, with someone to help you, or in a group or class. It is hard to work by yourself, so it is a good idea to have someone who can give you advice and feedback (a mentor). This person could be a trainer from a college or community centre, a relative, a neighbour or a friend.

The unit is written so you can start at the beginning and work through it. Or if you like you can choose parts of the unit and only do those parts. Spend more time on the parts which are most useful for you. If something is not useful, you can skip it.

There is no certificate to go with the SMAT materials. But SMAT helps you improve your skills so you can do other courses and get other certificates. For example: FarmSmart, Rural Business Management, and courses run by the Department of Natural Resources and Environment. You will also find that working through SMAT improves the communication and numeracy skills that you need in your working life.

Outcomes

After you finish the SMAT materials you will be able to communicate more effectively in speech and writing and use numeracy skills more effectively. You will also be able to carry out a cost/risk assessment.

How long should I spend?

This depends on you. The amount of time will be different if you are working by yourself or in a group, with a mentor or without, and if you do all the activities or not. Take enough time to do all the activities that are relevant to you, to a standard high enough to satisfy you.

Activities

Each unit has a number of activities for you to do. In the communications units there are four types of activities:

- key word activities
- reading activities
- writing activities
- spoken communication activities.

In the numeracy units there are numeracy activities.

Sometimes you can write answers to these activities in the book. Sometimes it is better to write them in a notebook. Sometimes for the spoken communication activities you will need to go and speak to some other people.

In some places there are also practice writing and practice reading activities. These are extra activities. You can choose to do them if you think you want extra practice in something.

Most of the activities have model answers in the back of the book. You can also ask your mentor to check your answers.

What you need

Before you start, make sure you have the following:

- a notebook (A4 size is best)
- pens, pencils, highlighter pens
- a file or folder to keep extra papers.

Assessment

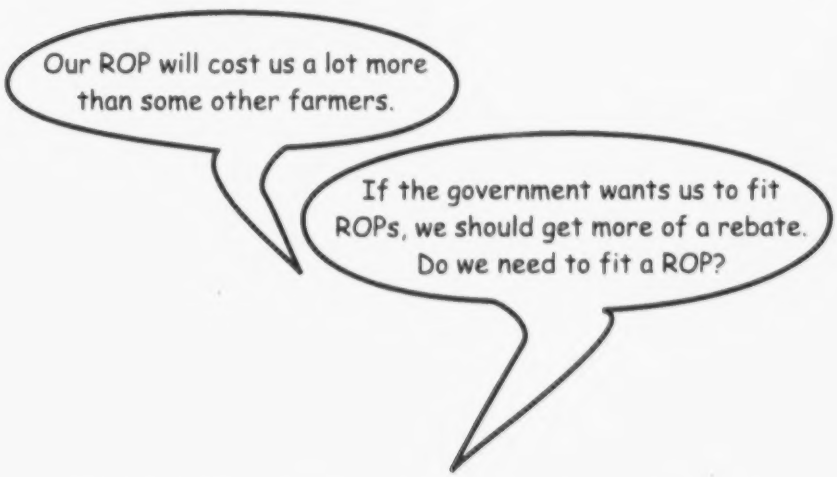
There is no formal assessment for SMAT. But it is a good idea to have a mentor look at what you have done. That way you can decide together what you have learned and what you need to improve.

Remember, the SMAT materials are a resource for you to use to improve your skills. It is up to you how you use them and how much of them you use.

Cost/risk analysis - single item

Gary and Ruth complained about the cost of putting a rollover bar on their tractor. A standard bar would not fit on their tractor because it was not a common make and it was a very old model. The bar they needed to fit would cost them $2500.

Ruth and Gary receive a $150 rebate from the government for fitting a Rollover Protection (ROP). They feel it is unrealistic that the government gives everyone the same rebate, no matter what type of bar is required.


Our ROP will cost us a lot more than some other farmers.
If the government wants us to fit ROPs, we should get more of a rebate. Do we need to fit a ROP?

The legislation in 1997 stated that all tractors manufactured after 1981 needed to be fitted with a ROP unless they were being used indoors or in an orchard. You should check the current legislation.

Gary and Ruth were advised to do a cost/risk analysis to verify if it would be a sensible decision to install a ROP, regardless of the cost or legislation.

What is a cost/risk assessment?

A cost/risk assessment compares the cost of making a change to the cost involved if there is an accident and the likelihood or risk of an accident happening.

Ruth and Gary make a list of the possible costs involved if they do not install a ROP and an accident occurs. Here is some of Ruth and Gary's list:

- replacement cost of a worker
- lost production time.

Activity 1

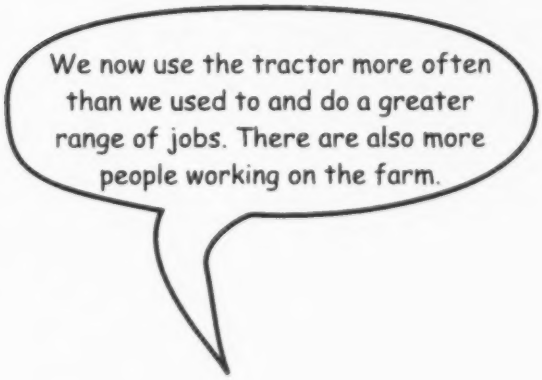
Can you think of any more? List them in the space provided.

Assessing the risk

Ruth and Gary also consider the likelihood of an accident occurring.

My grandfather never had an accident, my father never had an accident and I have never had an accident and we have driven tractors every day of our lives.
Yes, there hasn't been a tractor accident on this farm for 70 years

They realise that tractor use has changed over the last generation.


We now use the tractor more often than we used to and do a greater range of jobs. There are also more people working on the farm.

Activity 2

Look at the following graph.

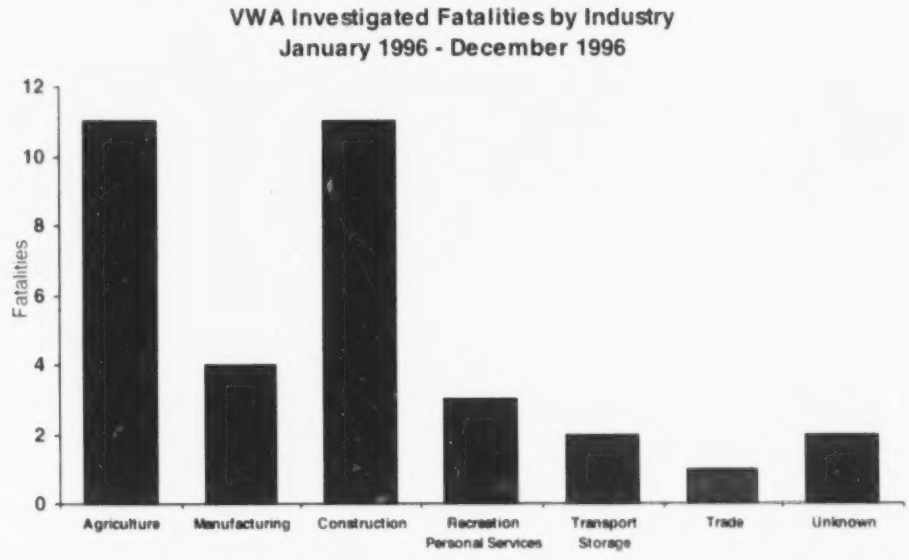


Figure 1: VWA investigated deaths by industry.

1. This is a column graph of VWA investigated deaths by industry for January 1996 to December 1996.

   - Which industries have had the most deaths in this time?

   - How many deaths have occurred in agriculture?

   - Do you think that there are as many people working in agriculture as there are in construction ?

   - If more people work in construction, in which industry are people more likely to die?

2. Now look at the following table and add up the total number of tractor deaths for each state.

year	Qld	NSW	Vic	Tas	SA	WA	NT	Total
1985	11	Na	3	1	na	2	na	na
1986	9	Na	13	1	na	0	na	na
1987	10	2	7	2	na	3	na	24+
1988	3	8	11	1	3	1	0	27
1989	11	1	3	0	3	1	0	19
1990	5	4	10	2	0	3	0	24
1991	8	11	6	2	1	1	0	19
1992	5	7	7	2	1	1	0	23
1993	10	5	10	1*	1	2	0	29+
1994	5*	6*	7*	Na	2*	1*	0	22+
TOTAL								

* means incomplete data
na - means not applicable - information not collected or not available.

- Which state has the most accidents?

- Do you think that Victoria has as many people working on farms as in New South Wales?

3. Look at the following column graph.

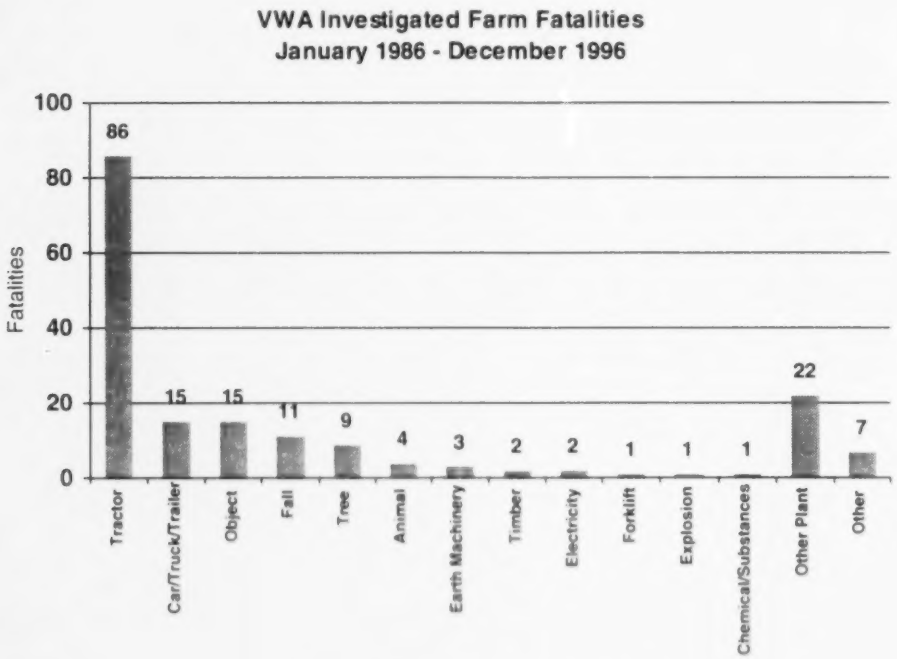


Figure 2: VWA investigated farm fatalaties.

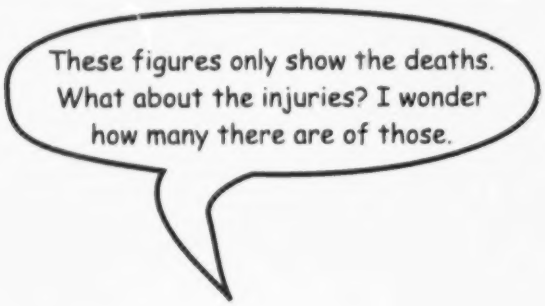
This is a column graph of deaths that have occurred in Victoria on farms from January 1996 to December 1996.

- What causes the most deaths?

- How many deaths are caused by tractors?

- Does the number of deaths caused by tractors seem like a lot?

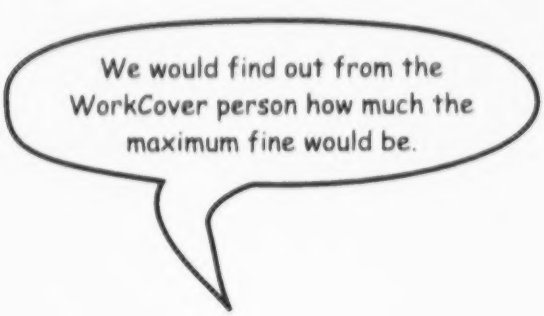
Gary and Ruth examine these graphs. They realise that this is not a complete picture.



4. List some injuries on farms caused by tractors that would not have been counted in the Victorian WorkCover Authority (VWA) statistics.

Calculating costs

Ruth and Gary put costs against their list. They decide they do not have enough information and need to find out more.



The WorkCover representative told them that if an accident or death occurs on their property and they are shown to be negligent then the maximum fine for an individual is $50 000 and for a corporation $250 000 under the Occupational Health and Safety Act and Occupational Health and Safety (Plant) Regulations.

Ruth and Gary estimate the length of time they will need to employ a causal worker to replace the person involved in the accident. Then they estimate the cost.

Tractor accidents are usually serious, it would probably take at least two months before the person can return to work.
Even then they may not be able to work a full load. Let's say we need to employ someone for 3 months. That's $24 000 for a year so we are looking at $6000 for 3 months.

Then they discuss the time lost after an accident and the times they will need to be available to the WorkCover investigator to investigate the accident.

The down time would include loss of income from spoilage of product or not being able to fully maintain the farm program to ensure a healthy yield.

Activity 3

1. List the jobs you did on your farm in the last week.

2. If a third of your time was used in other ways, list those jobs that would not be completed or done from the list above.

3. What effect would this have on your produce?

4. Can you estimate the cost involved in not completing these jobs or calling in a contractor to complete them?

5. Is there a higher cost involved due to lost time if the accident occurs in summer? Winter?

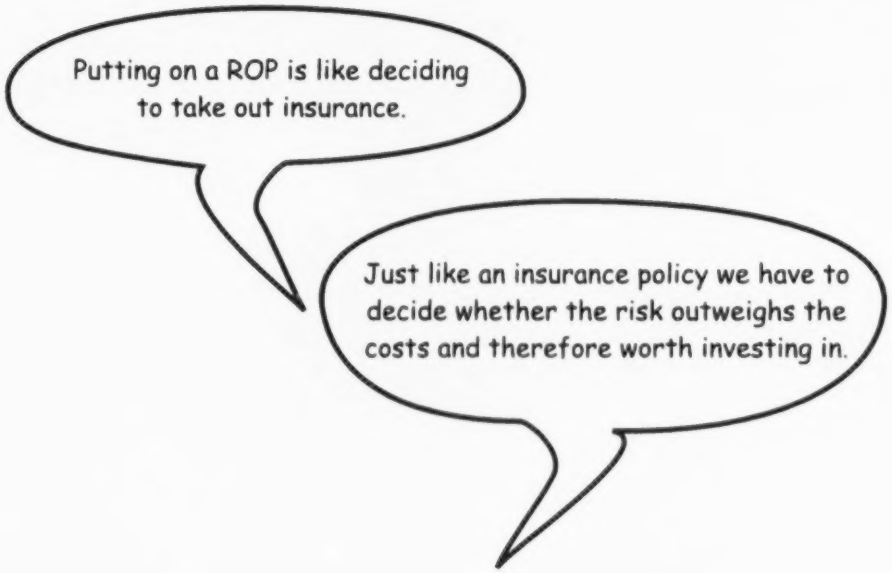
Making a decision

Ruth and Gary have estimated their costs to be:

Fine	$10 000
Replacement of worker	$6000
Down time costs	$4000
Total	$20 000

We haven't yet costed in the legal fees, any repairs or replacement of the tractor.
Yes, and none of this takes into account the trauma and grief of an accident. The person involved in the accident could be disabled for life.

Gary and Ruth have a clearer understanding of the costs involved if there is an accident. Now they can make a decision based on this information.


Putting on a ROP is like deciding to take out insurance.
Just like an insurance policy we have to decide whether the risk outweighs the costs and therefore worth investing in.

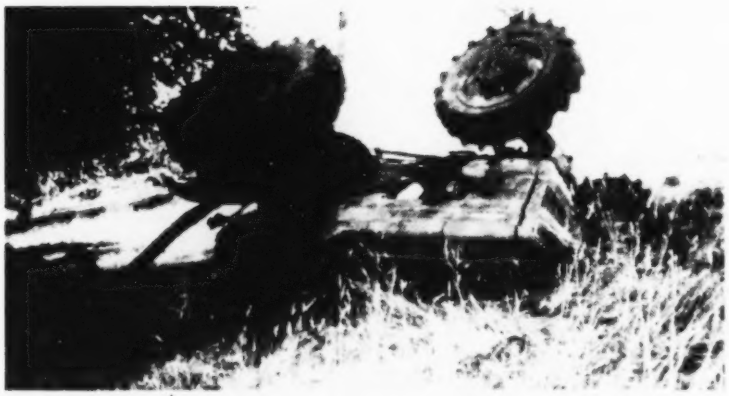
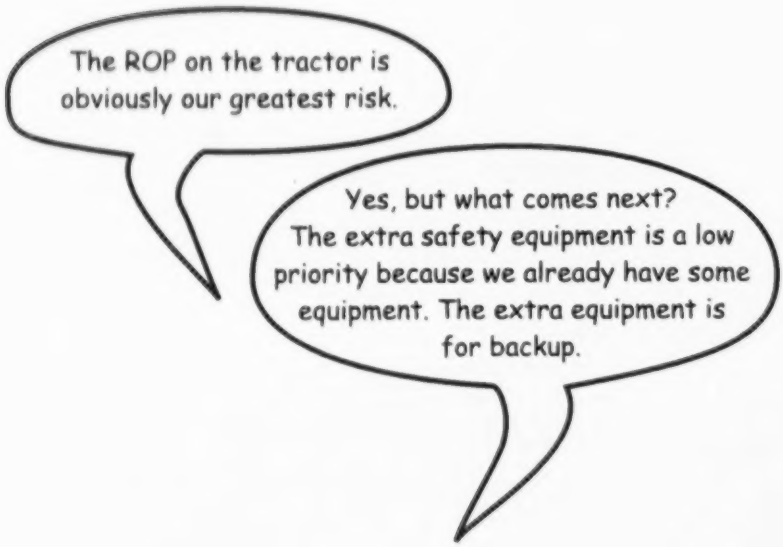


Figure 3: Tractor with rollover protection.

Cost/risk analysis - whole farm

The example that we looked at previously was an analysis on a single item. It is just as important for farmers to do a cost/risk assessment on the whole farm. Often on a farm there is more than one hazard that needs fixing. Ruth and Gary list down the hazards that they need to fix around their farm.

They prioritise the list. They number them from 1 to 6. Number 1 represents the one they feel involves the greatest risk down to 6, the least risk.


The ROP on the tractor is obviously our greatest risk.
Yes, but what comes next? The extra safety equipment is a low priority because we already have some equipment. The extra equipment is for backup.

This is how the list looks.

3 Fence off the dam next to the house

2 Provide better storage for chemicals

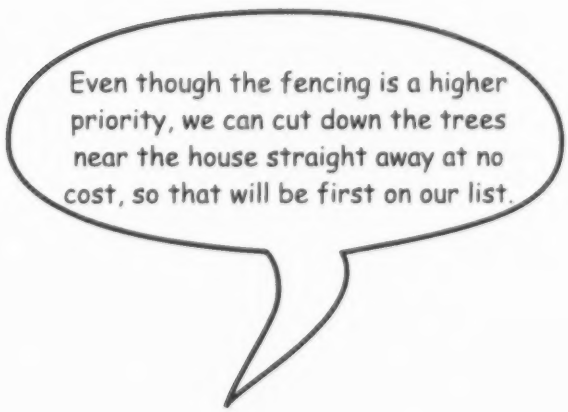
1 Fit a ROP to the tractor

6 Clear away the trees close to the house

4 Purchase more safety equipment for the spraying of chemicals

5 Raise the height of the sorting table

Then they write down the cost of fixing each hazard next to the items.


Even though the fencing is a higher priority, we can cut down the trees near the house straight away at no cost, so that will be first on our list.

They recreate the list putting it into order. They put a time-line against the hazards.

No.	Hazard	Cost	Date to be done by
1	Clear away the trees close to the house	Nil	2/5/97
2	Raise the height of the sorting table	Timber $10	9/5/97
3	Fit a ROP to the tractor	$2500	2/6/97
4	Provide better storage for chemicals	$10 500	2/8/97
5	Fence off the dam next to the house	$2350	2/11/97
6	Purchase more safety equipment for the spraying of chemicals	$825	1/2/98

Activity 4

1. Make a list of the hazards that you know of around your farm.

2. Prioritise your list by numbering the hazards in order of greatest risk to least risk.

3. Where possible put a cost against the hazard.

4. Complete the following table with your information.

No.	Hazard	Cost	Date to be done by
1			
2			
3			
4			
5			
6			
7			
8			
9			

Now that you have a safety plan, it is easier to see what has to be done and you have a time-line to work within.

I feel that the problems aren't as big as they first seemed. Now that we have an action plan to work to, we can see what has to be done. We also have some guidelines for times so we can plan to have money available at this time.

Model answers

Activity 2

1.

- The agricultural and construction industries had the most number of deaths.
- 11 deaths occurred in agriculture.
- There are fewer people working in agriculture than there are working in construction. There are people working in agriculture and people working in construction.
- You are more likely to die if you work in agriculture.

2.

Year	Qld	NSW	Vic	Tas	SA	WA	NT	Total
1985	11	na	3	1	na	2	na	na
1986	9	na	13	1	na	0	na	na
1987	10	2	7	2	na	3	na	24+
1988	3	8	11	1	3	1	0	27
1989	11	1	3	0	3	1	0	19
1990	5	4	10	2	0	3	0	24
1991	8	11	6	2	1	1	0	19
1992	5	7	7	2	1	1	0	23
1993	10	5	10	1*	1	2	0	29+
1994	5*	6*	7*	na	2*	1*	0	22+
TOTAL	77	44	77	12	11	15	0	236

- Queensland and Victoria had the most accidents.
- Victoria is a smaller state with fewer people living in it, so it probably has fewer farmers than New South Wales.

3.

- Tractors caused the most deaths.
- 86 deaths were caused by tractors.